BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicants(s)	:	A. M. MURCHING ET AL.
Serial No.	:	09/496,068
Filed	:	FEBRUARY 1, 2000
For	:	A PROCESS TO EXTRACT REGIONS OF HOMOGENOUS COLOR IN A DIGITAL PICTURE
Examiner	:	C. LAROSE
Art Unit	:	2623

APPEAL BRIEF

May It Please The Honorable Board:

Sir:

The Applicants appeal the rejection of Claims 1, 3-5, and 8. The $330.00 fee for filing this Brief is to be charged to Deposit Account No. 07-0832.

Applicants also request a one-month extension for the filing of this appeal brief from August 16, 2004, the due date for which this brief was due. The $110.00 fee for the extension is to be charged to Deposit Account No. 07-0832.

Please charge any additional fee or credit any overpayment to the above-identified Deposit Account.

Applicants do not request an oral hearing.

REAL PARTY IN INTEREST

The real party in interest, the Assignee, is:
Thomson Licensing S.A., 46 quai Alphonse La Gallo, Boulogne Billancourt, 92100 FRANCE

Certificate of Mailing Under 37 C.F.R. 1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, Alexandria, VA 22313-1450 on September 16, 2004.

Joel Fogelson

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF THE CLAIMS

Claims 1, 3-5, and 8 are rejected

Claims 1, 3-5, and 8 are appealed.

Claim 6 was amended into an allowable form, as suggested by the Examiner in the Rejection.

STATUS OF AMENDMENTS

All amendments to the Claims, as filed in the 41.33(a) and 1.116 amendment submitted on September 15, 2004, are reflected in the claims included in the Appendix.

SUMMARY OF CLAIMED MATTER

Independent Claim 1 claims a method for extracting homogenous color from a digital picture. The method includes the steps of dividing a digital picture into blocks (specification, page 3, lines 5-11). Merging together adjacent blocks, the merging operation by extracting a feature vector for each block (specification, page 3, line 20 to page 4, line 4), estimating a gradient value for the block (specification, page 4, line 10-14). The gradient field is then digitized (specification, page 5, line 16-17), and then processed using a watershed technique (specification, page 7, lines 6-14).

Independent Claim 8 claims a method for representing regions of homogeneous color in a digital picture. Specifically, the picture is first divided into discrete blocks (specification, page 3, lines 5-9). Next, a scalar gradient value for each block is estimated, (specification, page 4, lines 9-22). Then the blocks that are homogenous in color and the distances between such blocks are used to calculate a probability mass function, (specification, page 8, lines 13-22). The claimed search/database application is supported in the specification on page 7, lines 15 to page 8, line 7).

STATEMENT OF GROUNDS OF REJECTION

Claims 1 and 3-5 are rejected under 35 U.S.C. §103(a) over "Automatic Watershed Segmentation of Random Textured Color Images" to Shafarenko et al. (hereafter entitled 'Shafarenko') in view of "Unsupervised Video Segmentation Based on Watersheds and Temporal Tracking" to Wang and in further view U.S. Patent 5,577,131 to Oddou.

Claim 8 is rejected under 35 U.S.C. §103(a) over "Incorporation of Derivative Priors in Adaptive Bayesian Color Image Segmentation" by Luo et al. (hereafter referred to as 'Luo') in view of "Pyramidal Retrieval by Color Perceptive Regions" by Corridoni et al. (hereafter referred to as 'Corridoni').

ARGUMENTS

THE 35 U.S.C. § 103 REJECTION OF CLAIMS 1 and 3-5

Reversal of the Rejection ("hereinafter termed rejection") of Claims 1 and 3-5 under 35 U.S.C. §103(a) over "Automatic Watershed Segmentation of Random Textured Color Images" to Shafarenko et al. (hereafter entitled 'Shafarenko') in view of "Unsupervised Video Segmentation Based on Watersheds and Temporal Tracking" to Wang and in further view U.S. Patent 5,577,131 to Oddou. The rejection makes the following crucial errors.

Claim 1 claims a process of extracting regions of homogenous color in a digital picture where such a process occurs by the method "dividing the digital picture into blocks where each block comprises a plurality of pixels". The Examiner in the rejection cites to Shafarenko as disclosing the step of "dividing the digital picture into blocks (Shafarenko operates on pixels which are the smallest image blocks" (Rejection, page 2, lines 22-23).

Later in the rejection, the Examiner acknowledges that Shafarenko and Wang are silent about dividing a digital picture into blocks, but the Examiner cites to Oddou as disclosing "the major advantage of operating on blocks of pixels rather than individual pixels to segment an image is apparent to those skilled in the art" (Rejection, page 4, lines 18-20). The Examiner concludes that it would have been obvious to modify Shafarenko and Wang by Oddou to anticipate the invention in Claim 1.

Applicants note that the Shafarenko reference teaches away from the Examiner's combination of Shafarenko with Wang and Oddou in terms of modifying the process of Shafarenko to utilize blocks instead of pixels. Specifically, the process of Shafarenko is described for processing textured images, "especially for the case of randomly textured color images, such as granites," (Shafarenko, Introduction). Shafarenko then describes examples how with "size-based filters or their combinations, then small but significant features in terms of color saliency may be removed," (Shafarenko, Introduction). Hence, the application of Shafarenko discloses that pixels are to be used because such color features (as for granite) are to be missed, if any of segmentation technique would be used.

If one were to apply a segmentation technique of blocks, as suggested by the Examiner from Oddou, the modified form of Shafarenko would miss certain color variations, as the block segmentation as inherently miss detail that would be disclosed at the pixel level.

Furthermore as the Examiner acknowledges in the rejection, "Oddou seeks to segment by texture rather than by color," (Rejection, page 4, lines 18-20) compared to Shafarenko and Wang. Applicants submit that this difference of what is segmented in Oddou (texture instead of color) further teaches away and makes it unlikely that it would be obvious for one skilled in the art would modify Shafarenko and Wang by Oddou, as suggested by the Examiner in the rejection.

For the reasons given above, Claim 1 is believed to overcome the rejection under 35 U.S.C. § 103(a), and Applicants request that the rejection of this claim be withdrawn. Additionally, dependent Claims 3-5 are patentable as these claims depend on Independent Claims 1. Applicants request that the rejection of Claims 3-5 be withdrawn

THE 35 U.S.C. § 103 REJECTION OF CLAIM 8

Reversal of the rejection of Claim 8 under 35 U.S.C. §103(a) over "Incorporation of Derivative Priors in Adaptive Bayesian Color Image Segmentation" by Luo et al. (hereafter referred to as 'Luo') in view of "Pyramidal Retrieval by Color Perceptive Regions" by Corridoni et al. (hereafter referred to as 'Corridoni'). The rejection makes the following crucial errors.

Claim 8 claims a step of "representing said data corresponding to the digital picture as a probability distribution function calculated in view of blocks of the digital picture that are homogenous in color and distances between the blocks that are homogenous in color" where such a step is used for an "image database application". The Examiner in the rejection acknowledges that Luo is "silent to the data being suitable for use in an image database application," (Rejection, page 8, line 11). Hence, the Examiner combines the image querying system of Corridoni with the data described in Luo to anticipate the features of Claim 8.

Applicants note that the described system of Corridoni teaches away from the use of data where such data "is calculated in view of blocks of the digital picture that are homogenous in color and distances between the blocks

that are homogenous in color". Specifically, the generation of data in Corridoni is performing by an image segmentation operation where "regions have to be uniform in color (i.e. the color distance between pixels of the same region should be small)," (Corridoni, page 207, paragraph 4). Hence, Corridoni is concerned with the operation of regions where distances are minimal.

In contrast, Claim 8 claims the use of data where a probability function is generated in view of, "blocks of the digital picture that are homogenous in color and distances between the blocks that are homogenous in color". Hence, the distances between blocks homogenous in color are important for the search operation claimed in Claim 8, versus Corridoni that discloses that such distance information is to be small, for the proper operation of the invention. Applicants submit that this disclosure of Corridoni teaches away from its combination with Luo, as suggested by the Examiner in the rejection.

For the reasons given above, Claim 8 is believed to overcome the rejection under 35 U.S.C. § 103(a), and Applicants request that the rejection of this claim be withdrawn.

Accordingly, the Applicants submit that the application is in condition for allowance.

Respectfully submitted,

A. M. MURCHING ET AL.

By: Joel M. Fogelson, Attorney
Registration No. 43,613
609/734-6809

Patent Operations
Thomson Multimedia Licensing, Inc.
P.O. Box 5312
2 Independence Way
Princeton, New Jersey 08543

September 16, 2004

APPENDIX I
APPEALED CLAIMS

WHAT IS CLAIMED IS:

1. (previously presented) A method of extracting regions of homogeneous color in a digital picture comprising the steps of:

dividing the digital picture into blocks wherein each block comprises a plurality of pixels; and

merging together spatially adjacent blocks that have similar color properties to extract the regions of homogeneous color, wherein the merging step comprises the additional steps of:

extracting a feature vector for each block;

estimate a scalar gradient value for each block as a function of the feature vector, the set of gradient values defining a color gradient field;

digitizing the color gradient field;

preprocessing the digitized color gradient field to produce a smoothed color gradient field; and segmenting the smoothed color gradient field with a watershed algorithm that divides the smoothed color gradient field into a set of spatially connected regions of homogeneous color.

2. (cancelled)

3. (previously presented) The method as recited in claim 1 wherein the extracting step comprises the steps of:

transforming data in each block into a perceptually uniform color system; and

calculate N moments of the data in each block for each color component, the set of moments being the feature vector for the block.

4. (previously presented) The method as recited in claim 1 wherein the estimating step comprises the steps of:

obtaining distances between the feature vector of each block and the feature vectors of each neighboring block; and

selecting the maximum of the distances as the gradient value for the block.

5. (original) The method as recited in claim 4 wherein the obtaining step comprises the steps of:

applying a weighted Euclidean distance metric to the feature vectors to obtain the distances.

6. (previously presented) A method of extracting regions of homogeneous color in a digital picture comprising the steps of:

dividing the digital picture into blocks wherein each block comprises a plurality of pixels; and

merging together spatially adjacent blocks that have similar color properties to extract the regions of homogeneous color, wherein the merging step comprises the additional steps of:

extracting a feature vector for each block;

estimate a scalar gradient value for each block as a function of the feature vector, the set of gradient values defining a color gradient field;

digitizing the color gradient field;

preprocessing the digitized color gradient field to produce a smoothed color gradient field; and segmenting the smoothed color gradient field with a watershed algorithm that divides the smoothed color gradient field into a set of spatially connected regions of homogeneous color; wherein

wherein the estimating step comprises the steps of:

obtaining distances between the feature vector of each block and the feature vectors of each neighboring block; and

selecting the maximum of the distances as the gradient value for the block; and

wherein the obtaining step comprises the steps of:

converting the feature vector of each block into a probability mass function-based representation for each color component;

computing distances between the probability mass function-based representations of each block and the corresponding probability mass function-based representations of each neighboring block; and

selecting the maximum distance of the probability mass function based representations as the gradient value for the block.

7. (cancelled)

8. (previously presented) A method for representing spatial relationships between regions of homogeneous color in a digital picture producing data suitable for use in an image database application comprising the steps of:

dividing the digital picture into blocks;

estimating a scalar gradient value for each block by defining a color gradient field corresponding to each block;

representing said data corresponding to the digital picture as a probability distribution function calculated in view of blocks of the digital picture that are homogenous in color and distances between the blocks that are homogenous in color.

APPENDIX II
EVIDENCE RELIED ON

Shafarenko, Leila et al., "Automatic Watershed Segmentation of Randomly Textured Color Images", IEEE Transactions on Image Processing, Vol. 6, No. 11, November 1997.

Wang, Demin, "Unsupervised Video Segmentation Based on Watersheds and Temporal Tracking", IEEE Transactions on Circuits and Systems for Video Technology, Vol. 8, No. 5, September 1998.

Oddou, U.S. Patent # 5,577,131, issued November 19, 1996.

Luo, Jiebo et al., "Incorporation of Derivative Priors in Adaptive Bayesian Color Image Segmentation", IEEE 1998.

Corridoni, J.M. et al., "Pyramidal Retrieval by Color Perceptive Regions", IEEE 1997.